

### 3.0 THE INCIDENT CHRONOLOGY

This chapter summarizes the chain of reasoning and events that led to delays in discovering the actual contamination problem and in communicating that discovery to the City of Richland. It also explains the events summarized on the overall timeline (Exhibit A) of the incident. The chronology (Section 3.3) is arranged by date, with code numbers corresponding to the codes on the timeline identifying each event. The code numbers (A1, S1, O1, etc.) use a letter to indicate the month (A = August, S = September, O = October) in which the event occurred and a number to identify each individual event. The numbers are for reference purposes only and do not signify either the importance or chronological location of an event. Dates are omitted where no relevant event or action of significance occurred.

#### 3.1 CHAIN OF REASONING

During the course of this investigation, its scope and importance grew, as did the number of parties interested in its outcome. What was investigated originally as an isolated event in which an individual might have tracked or carried contamination out of a radiation zone became a biological puzzle in which clues revealed over three days in September 1998 led the team down various investigative pathways. Finally, on September 30, the clues and the pathways taken came together, and the team recognized that contamination had indeed reached the City landfill.

In the days leading up to the event, the occupants of the trailer complex including the MO-967 Mobile Office were moving to a complex in the 200 West Area. This was done to remove personnel from an area of past rodent-borne contamination as well as to reduce costs. When the contamination was found, the facilities were, for practical purposes, vacant. However, individuals working over the weekend did go into the MO-967 Mobile Office to eat lunch.

Because the area around B Plant has a history of contaminated rodent droppings, the MO-967 Mobile Office was on a regular surveillance schedule. The surveys included searches in the places that mice typically frequent (e.g., along baseboards, cabinet edges). Through Friday, September 25, all the surveys had been negative. On Monday morning, September 28, contamination was discovered in the MO-967 Mobile Office. Because contamination was discovered on the light switch, a knife, and a cutting board, it was initially believed that an individual had a contaminated hand. As is typical with these investigations, the RCTs contacted the supervisor and secured the area to keep others from being inadvertently contaminated. The RCTs took action to locate the individual with the contamination and began an expanding search to detect either the source of the contamination or additional cross contamination.

*Note: When a pair of contaminated boots and socks were discovered, the team thought they might have located the individual spreading the contamination. The team now believes that the individual with the contaminated boots and socks may have been cross-contaminated by the fruit fly-borne contamination that also contaminated the refuse.*

As the investigation expanded, several secondary theories were considered because of the unusual pattern of contamination spread (e.g., contamination on the tip of a knife, not the

handle). The discovery of contaminated chewing tobacco in the refuse pail led the team to believe that an employee might have been internally contaminated. Because employee health and safety is extremely important at the Hanford Site, an investigation began to determine who was in the MO-967 Mobile Office over the weekend. The theory of a contaminated individual was proven false several weeks later when bioassay results for over 100 individuals all were negative.

As the RCTs expanded their search from the MO-967 Mobile Office refuse container to the dumpster outside, they discovered contaminated refuse and isolated the dumpster. This facility had had limited recent use, so the RCTs had no reason to believe that a large amount of refuse should have accumulated since the dumpster was last emptied. They did not know that this dumpster had been moved a short distance earlier that morning and that the compactor truck operator also emptied the dumpster to save himself a trip on Tuesday. Someone threw refuse in the dumpster after it was moved, further reinforcing the impression that it had not been emptied. Because this occurred on Monday, and refuse is normally picked up on Tuesday, the RCTs believed that the contamination had been caught before it went off Site.

As the investigation expanded, contamination was found in other locations, many of which did not match the typical pattern for rodent or individual cross contamination. On Tuesday, September 29, an RCT performing a radiological survey of moisture on a pipe observed the contamination “flying away.” Because this seemed odd, the RCT had her partner repeat the survey, with the same results. This was the first known case in the DOE complex of fruit flies being a biological vector for contamination spread.

The confusing evidence, the increasing scope of the investigation, and the different investigative pathways led to a fact-finding meeting being convened on Wednesday, September 30. At this meeting, accumulated data on the contamination finds were discussed. As the facts were compared, it became evident that a large contamination event was still under way, the dumpster had been emptied on Monday morning, and the refuse had been hauled off the Hanford Site to the City landfill. When this was discovered, the City landfill manager was notified by telephone, orders were given to quarantine all refuse trucks, and an RCT was dispatched to perform surveys at the City landfill.

Hindsight allows one to wonder why no one realized until Wednesday that the dumpster had been emptied on Monday. The investigation team was hampered in identifying that contaminated refuse had been released from the Hanford Site by the following circumstances.

- The team was unaware of the unexpected emptying of the dumpster a day early.
- The dumpster contained refuse when it was surveyed.
- The low use of the facility was consistent with the small amount of refuse found in the dumpster.
- The team initially believed that a single individual was contaminated.

Actually, the FDH surveillance system worked as it should have. Routine surveys uncovered the new biological vector. The team reviewed all the apparently unrelated events to eventually reach the correct conclusion. The lessons learned from this event, as discussed in Chapters 5.0 and 6.0, will help preclude a similar occurrence in the future.

### **3.2 TIMELINES**

Figure ES-1 presented a summary timeline of the major events that occurred during the contamination incident on the Hanford Site and at the City landfill. The overall timeline is presented in Exhibit A. The events on the overall timeline are alphanumerically coded for cross-referencing to the same events on the following chronology. It provides a detailed sequence of key events and interactions by various components during the incident.

### **3.3 DETAILED DATA**

The chronology of key events is outlined under the corresponding days as follows.

#### Tuesday August 4

- A1-Contaminated mouse feces were found around B Plant (survey #001202).

#### Tuesday August 11

- A2-DYN began daily routine radiological surveys in the Fluor Daniel Northwest, Inc. (FDNW) construction facilities (the MO-958 Office/Lunchroom Trailer, the MO-964 Mobile Office, the MO-967 Mobile Office, and the 2201-B Construction Ice House) and weekly surveys of the FDNW construction site. The increased surveillance was in response to a request from B Plant/WESF (Waste Encapsulation and Storage Facility) Radiological Control, who had noted an increase in biological contamination around structures in the area. These surveys consisted of random direct beta/gamma spot checks of facility floors, direct beta/gamma checks of entryway door handles and walkways, and random beta/gamma surveys of tables and chairs inside the lunchroom trailer. The surveys included spot checks of tools, equipment, and stored materials, and random beta/gamma surveys of chairs, typewriters, computers, and telephones, if present in the facilities. These surveys did not routinely include dumpsters. Visual searches were performed for mouse feces and any found were surveyed for contamination. NOTE: Daily here means weekdays. Routine radiological surveys were not performed on Saturdays and Sundays.

#### Tuesday September 8

- S1-The FDH Office of Biological Control started receiving normal seasonal complaints about gnats and fruit flies.

Thursday September 10

- S2-Personnel prepared the 241-ER-152 Diversion Pit for work intended to isolate B Plant from the 200 East Area Tank Farm.
- S2-This work involved spraying a glycerin/monosaccharide (simple sugar)-based fixative material on the contaminated walls of the diversion pit to reduce the likelihood of contamination spread while work was conducted in the pit. The material had been used as an effective fixative on the Hanford Site for 2 years. The pit's concrete cover blocks were not removed for this activity; fixative was applied by spraying through engineered penetrations.

Friday September 11

- S3-A contaminated ant hill was found near the 241-ER-151 Diversion Pit.

Tuesday September 15

- S4-Work on the 241-ER-152 Diversion Pit began (Fig. 4). In accordance with work package 2E-98-01772/0, the planned work consisted of opening the pit, removing a solid jumper, installing a flexible jumper, and installing a process blank on the wall nozzle connection to B Plant. The concrete cover blocks were removed from the diversion pit at 3:30 a.m. to enable the B Plant isolation work to take place; they were reinstalled about 6:30 a.m.
- S4-Note: The work was performed inside a partially roofed plastic enclosure (a containment tent or greenhouse) located over the pit (Fig. 7). The area inside and around the enclosure was posted as a contamination area.
- S4-Note: The wind was from the south at less than 8 kilometers (5 miles) per hour. The work crew consisted of field crew personnel (operators), RCTs, a rigging crew with a crane, and industrial hygiene technicians. A qualified person in charge was overseeing the work.
- S5-At 3:30 a.m. the nozzle to the 241-ER-151 Diversion Pit was loosened, at 3:50 a.m. the nozzle to B Plant was loosened, and at 4:10 a.m. the nozzle to the 241-ER-153 Diversion Pit (approximately 1.5 kilometers [0.9 mile] east of B Plant) was loosened. The nozzle to B Plant drained approximately 45.5 liters (10 gallons) of liquid into the pit; the nozzle for the 241-ER-153 Diversion Pit drained approximately 909.2 liters (200 gallons) of liquid to the 241-ER-152 Diversion Pit. The liquid is water and process fluid residue that stayed in the lines after they were flushed following waste transfers. This contaminated water draining from the wall nozzles may have compromised the water-soluble glycerin/monosaccharide-based fixative used in the pit.

**Figure 7. Diversion Pit 241-ER-152 with Tent.**

- S6-Airborne contamination escaped from the working tent that surrounded the 241-ER-152 Diversion Pit and settled on nearby equipment and grounds. The levels and estimated activity were later discussed with WDOH on September 28, as noted in meeting minutes 013851, "Ten Day Report, 241-ER-152," by R. J. Swan, FDH.
- S7-Fruit flies in the area may have entered the pit and laid eggs. The cover blocks were replaced at approximately 6:30 that morning.
- S7-Follow-up surveys of the perimeter of the original contamination area showed contamination, primarily north of the tent, consistent with the wind direction. The crane used to support the work activity, located north of the tent, a light plant (portable lighting system) northwest of the original contamination area, a government-owned pickup truck located north of the area, and a forklift truck were found to be contaminated. Surveys continued into the day shift.
- S8-Note: Refuse was picked up in the 200 East Area and hauled to the City landfill. It is unlikely that any significant contamination from the incident could have reached this load because, in the fruit fly scenario, the eggs laid in or near the contaminated diversion pit would not have had time to mature into mobile adults (see Appendix J).
- S9-An air sample was taken in the 241-ER-152 work tent. Radiological analysis showed a high ratio of  $^{90}\text{Sr}$  to  $^{137}\text{Cs}$  in this sample.

Wednesday September 16

- S10-TWRS personnel began the cleanup of the contamination spread adjacent to the 241-ER-152 Diversion Pit from work performed the previous day. The light plant and the pickup truck were decontaminated and released. The crane was removed from the work area. Follow-up surveys of the perimeter of the now-expanded contamination area showed further contamination.
- S10a-The air sample taken in the 241-ER-152 work tent was counted.

Thursday September 17

- S10b-Note: Surveys were initiated to reduce the expanded contamination area to its original size. This process was completed on September 21.
- S11-Refuse was picked up in the 200 East Area.

Tuesday September 22

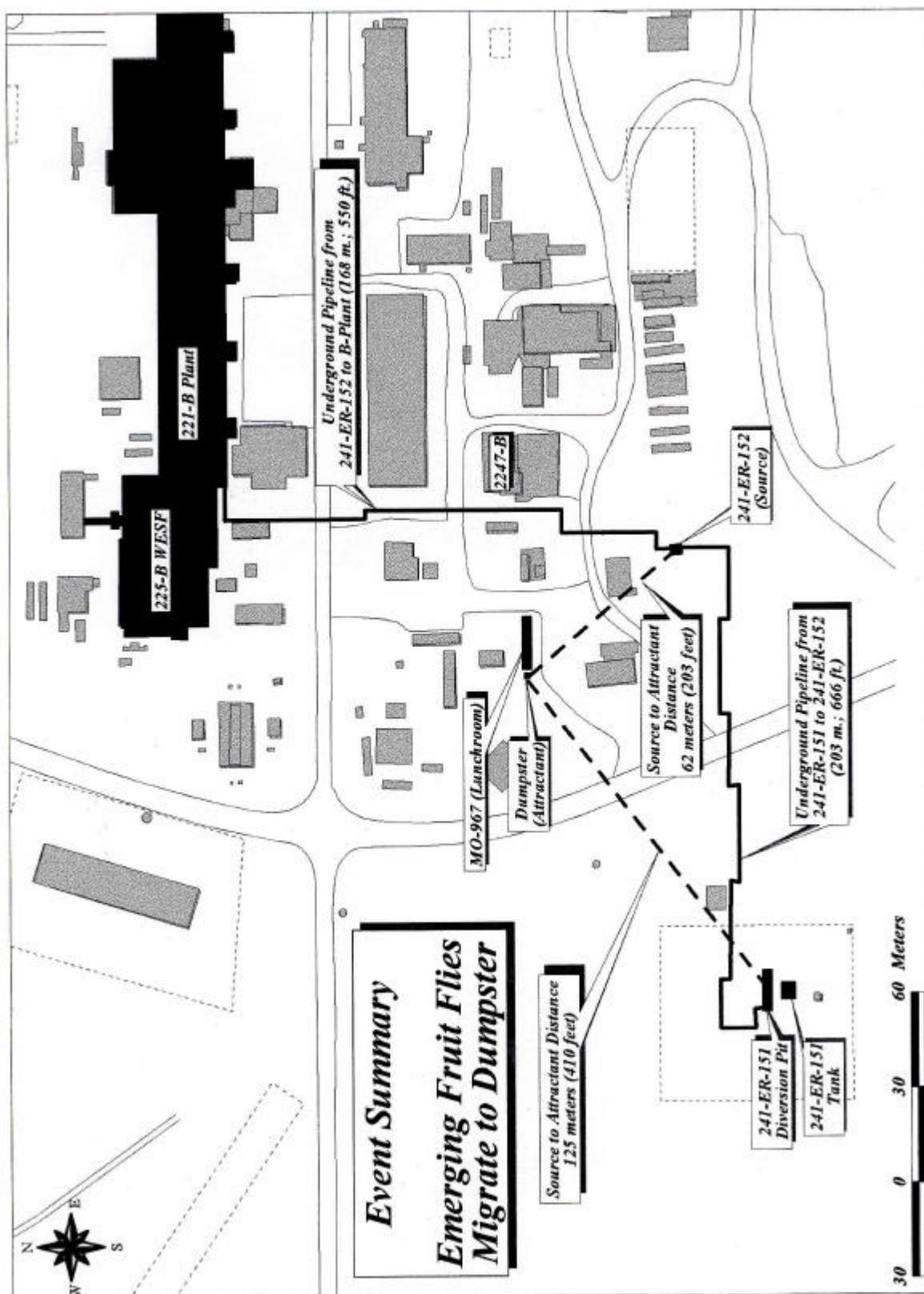
- S11-Note: Refuse was picked up in the 200 East Area and hauled to the City landfill. It is unlikely that any contamination from the incident could have reached this load, because fruit fly eggs laid in or near the contaminated diversion pit would not have had time to mature into adults.

Wednesday September 23

- S12-A piping leak check was performed in the 241-ER-152 Diversion Pit. Jumper leaks were found. The pit was not opened for this activity; the check was performed through engineered penetrations.
- S13-Debris arrived at the City landfill.
- S14-At a personnel contamination monitor, contaminated gloves were found in the pocket of an employee involved in work at the 241-ER-152 Diversion Pit. He had visited the 2247-B Ironworker's Shop after leaving the 241-ER-152 Diversion Pit.

Friday September 25

- S15-Garbage truck #6060 broke down. It was about 50 percent full of refuse from the 400 Area.
- S16-Garbage truck #3500 replaced #6060.
- S17-Routine survey of the MO-967 Mobile Office showed no contamination.
- S18-Northwest wind brought the scent of food and other refuse in the MO-967 Mobile Office to the 241-ER-152 Diversion Pit (Fig. 8).

**Figure 8. Event Summary – Emerging Fruit Flies Migrate to Dumpster.**



- S18a-B Plant, TWRS, WMNW Environmental Monitoring, and the FDH Office of Biological Control personnel met to discuss the contamination spread in the area southwest of B Plant.

#### Saturday and Sunday September 26 and 27

- S19-The wind shifted from east to southeast then northeast, carrying fruit flies toward the MO-967 Mobile Office.
- S20-Although the power and water had been shut off, employees entered the MO-967 Mobile Office over the weekend to use the kitchen.
- S21-Work in the 2247-B Ironworker's Shop continued for the full weekend, in support of the 222-S Analytical Services of Waste Management Laboratories, WESF, and TWRS activities. The 2247-B Ironworker's Shop received contamination.

#### Monday September 28

- S19-The wind continued to shift from east to southeast then northeast, carrying fruit flies toward the MO-967 Mobile Office.
- S22-The MO-967 dumpster was emptied at 7:45 a.m. The dumpster had been requested to be moved approximately 9 m (30 ft) so that clean-up could be performed around the area. The driver decided that as long as he was moving the dumpster, he would also empty it, because the dumpster was scheduled to be emptied the following morning anyway. The dumpster was later surveyed because of the contamination findings in the MO-967 Mobile Office, not because of the move.
- S24-At ~8:30 a.m., radiological surveys of the MO-967 Mobile Office began. Contamination was found in the lunchroom and the lunchroom refuse pails. At approximately 9:00 a.m., the DYN lead RCT notified DYN Radiological Control management that contamination found in refuse cans appeared to be sputum from chewing tobacco. DYN Radiological Control management requested that surveys of the MO-967 Mobile Office continue. At the same time, FDNW management was notified and was requested to have workers, particularly those who chew tobacco, report to an area outside the MO-967 Mobile Office for survey. On arrival at the MO-967 Mobile Office, DYN Radiological Control management requested the RCTs to extend surveys outside of the MO-967 Mobile Office, including the dumpster. The only material in the dumpster was one bag of kitchen refuse and a bag of insulation. The bag of kitchen refuse in the bottom of the dumpster was found to be contaminated. The dumpster was immediately controlled as containing radioactive material. The dumpster was surveyed at approximately 11:30 a.m.

DYN Radiological Control management questioned FDNW management as to when the dumpster was last emptied. Because the 200 East Area FDNW complex was nearly vacated, it was thought that the dumpster was last emptied a week or two before. Consequently, it was believed that a worker had contaminated the MO-967 Mobile Office



over the weekend. It was also believed at this point that the bag of kitchen refuse was thrown into the dumpster over the weekend. FDNW management worked to locate the workers who may have used the MO-967 Mobile Office over the weekend, including any janitorial personnel who may have removed refuse from the MO-967 Mobile Office so that personnel surveys could be performed. Surveys also were extended to other facilities in the 200 East Area used by FDNW personnel, including an all-crafts lunchroom. DYN Radiological Control management notified LMHC Radiological Control and BWHC (B Plant) Radiological Control management of the contamination problem and requested that they check to see if workers from their companies had used the MO-967 Mobile Office over the weekend. It was communicated back that they had not. At this point, it was believed that a contaminated worker had caused the contamination spread over the weekend. There was no reason to immediately notify Hanford Site Transportation Management (garbage trucks) or the City landfill because it was not known that an unscheduled emptying of the dumpster had been performed earlier that morning.

- S24-Note: The MO-967 Mobile Office is about 62 meters (203 feet) northwest of the 241-ER-152 Diversion Pit and 125 meters (410 feet) from the 241-ER-151 Diversion Pit. (See Fig. 3 for the spatial relationship of these diversion pits and the MO-967 Mobile Office.)
- S25-The RCTs surveyed the dumpster outside the MO-967 Mobile Office at 11:30 a.m. and found reportable contamination. The RCTs found the contamination before the normal Tuesday refuse pickup. Therefore they believed that no contaminated refuse had been picked up and taken to the City landfill, which was incorrect. The RCTs isolated and radiologically posted the dumpster to prevent pickup.
- S23-The refuse was taken to the City landfill in truck #3500, arriving at 1:30 p.m.
- S27-The FDNW van used by crafts persons and the personnel using the van were surveyed; the personnel surveyed negative, but the van was found to be contaminated.
- S29-Initial information on contamination was provided to FDH Environmental Protection in accordance with *Washington Administrative Code* (WAC) 246-247, "Radiation Protection-Air Emissions." The RCT surveying the MO-967 Mobile Office attempted to contact the FDH Internal Dosimetry Site technical authority at approximately 9:30 a.m. because she believed that contaminated chewing tobacco found in a refuse can in the MO-967 Mobile Office possibly indicated that a worker who had used it over the weekend may have been internally contaminated. An RCT reached the FDH Radiation Protection Central Standards Group Manager and explained the contamination situation, and set up a bioassay of the worker (the bioassay indicated no contamination). This was the first notification to FDH Radiation Protection, and it was followed by an event status e-mail to several Site radiation control managers from the DYN Radiological Control manager at 3:28 p.m. FDH and PHMC radiation protection personnel investigated possible contamination sources and spread mechanisms (see Appendix B, Section B2.0, for further discussion).

Tuesday September 29

- S29-The initial notification of contamination was made to RL Environmental Assurance, Policy and Permits. The FDH Radiation Protection Director unofficially called the RL Radiological Control Manager the morning of September 29 concerning this incident. The official notification was made to the RL Assistant Manager, Facility Transition, at 11:30 a.m. on September 29.
- S30-More refuse from numerous locations on the Hanford Site was taken to the City landfill in garbage truck #3500 (the regular Tuesday pick-up). It was not known that the truck had been contaminated the previous day. The radiological control organizations believed that the contaminated dumpster had been isolated before it could be emptied (see S25 under Monday, September 28). Therefore, they did not contact the management of refuse pick-up and hauling operations (DYN Transportation Operations) to stop the delivery to the City landfill.
- S31-The contamination survey and the contamination-source investigation continued. When RCTs found contamination inside the MO-967 Mobile Office, they immediately tried to identify the source of the contamination (as they would on finding contamination in any area not posted for contamination). As a protective measure, they assumed that workers might have been involved in the contamination spread, but they also investigated transfer via other biological vectors. In this indoor situation, they specifically looked for mice as a contamination vector.

The previous Friday's survey (September 25) of the MO-967 Mobile Office had not identified any contamination. The names of all the individuals who had been in the trailer over the weekend were collected and the individuals were contacted.

NOTE: Over 100 employees eventually received whole-body counts for potential internal contamination. This process lasted over several weeks. No employees were found to have been contaminated.

The RCTs continued searching the MO-967 Mobile Office for any indications of the presence of mice and found none. In addition, the pattern of contamination spread (e.g., near a light switch, in refuse cans, on walls) was not consistent with experience of contamination from mice. Thus, mice were eliminated as a biological vector for this contamination spread.

- S32-During surveys on Tuesday, September 29, RCTs were surveying a pipe covered with condensate in the restroom of the MO-967 Mobile Office. It was noted that the condensate was covered with fruit flies. The pipe appeared to be contaminated, but when the RCT put the meter detector close to the pipe, the contamination levels decreased as the fruit flies flew away. A second RCT was called to the room to investigate this strange observation. By then the fruit flies had returned to the pipe and again the source of the meter indication of contamination 'flew away' with the fruit flies.

Because contaminated flying insects were a new vector for contamination spread, it was not immediately accepted. Over the next few days, similar fruit fly encounters, including finding several contaminated dead fruit flies, convinced everyone that fruit flies were transferring the contamination.

- S33-DYN initiated a Not-Classified Notification of an off-normal occurrence and began survey efforts with other area contractors (B&W Hanford Company [BWHC], LMHC, and Bechtel Hanford, Inc. [BHI]). WDOH was notified at 10:05 p.m. and faxed at 10:53 p.m. about contaminated socks found in a worker's home.
- S34-High levels of contamination were discovered in the 2247-B Ironworker's Shop.
  - The TWRS contractor performed an investigative survey in response to contamination on a boot found on an ironworker exiting the C Tank Farm area. Contamination was found inside the 2247-B Ironworker's Shop on metal plates on the floor, the top of a work table, a piece of angle iron on a work table, on the floor under the table, and on soil north of the building.
  - DYN Radiological Control performed a survey in response to the contamination event. Contamination was found inside the building on a metal angle iron, a triangular piece of metal, floor areas, and other items (e.g., tool box tray).

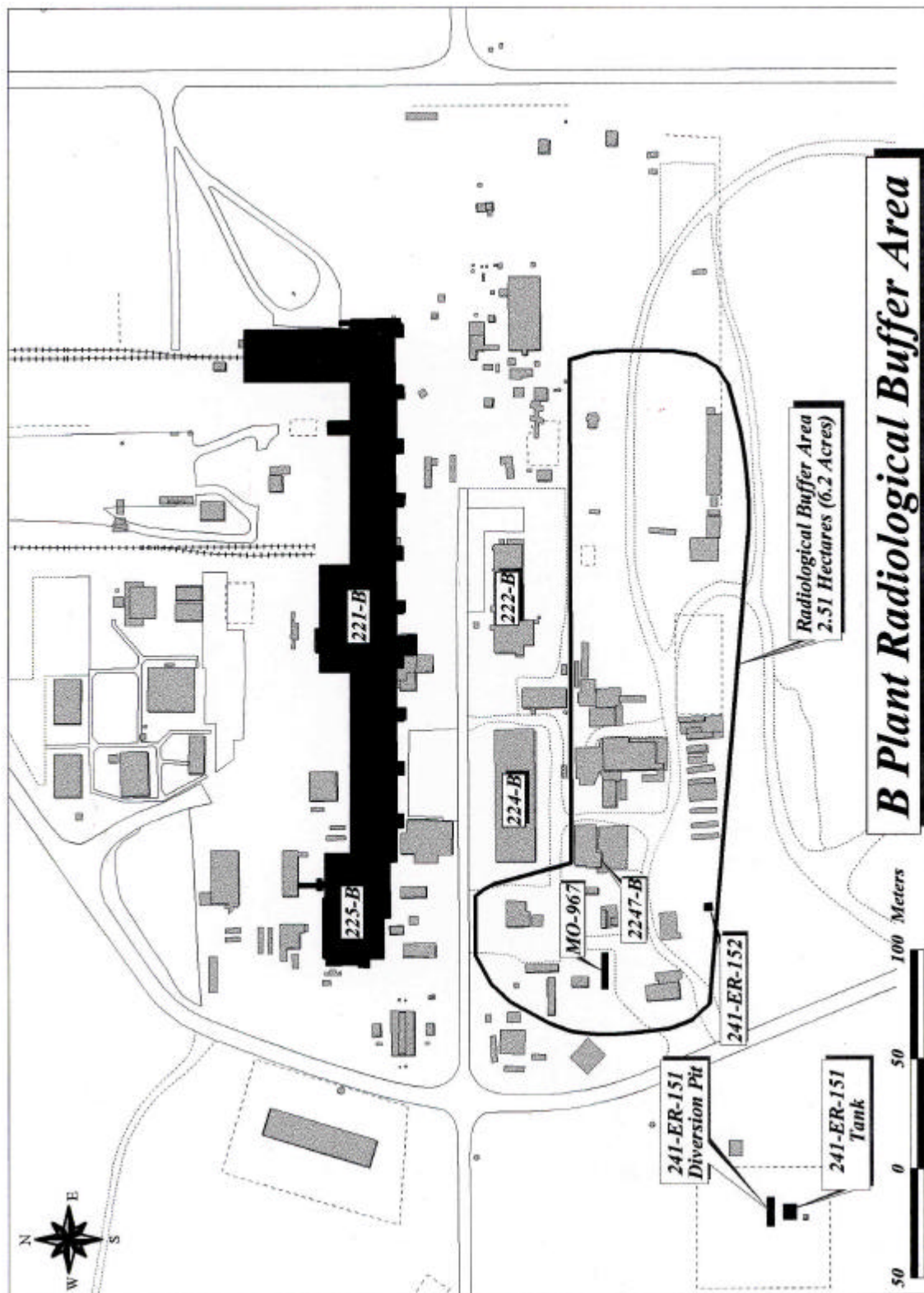
Some contamination discovered in the 2247-B Ironworker's Shop may have caused contamination spread by worker and/or material movements over the September 26-27 weekend. Subsequent investigations determined that fruit flies spread the majority of the contamination found in the area and the 2247-B Ironworker's Shop (see Appendix B, Section B2.5.3 for further discussion).

However, any item with a film of liquid can be an attractant for fruit flies at any time (they have been known to be attracted to alcohol-based ink). Contaminated animal urine can contaminate structural (e.g., metal, cement) objects, even though this was not proved to be the source of the contamination in the 2247-B Ironworker's Shop.

- S26-Extended surveys were initiated on September 28 to identify the person or persons who may have come in contact with the contamination.
- S28-Lockheed Martin Hanford Corporation (LMHC) Radiological Control informed DYN of an ironworker's contaminated boot.

Wednesday September 30

- S36-A PHMC fact-finding meeting was held at Building 2723-2 from 8:30 a.m. to 12:30 p.m. to identify the contamination source and devise a plan to decontaminate it, return all areas to a normal condition, and prevent recurrence of the event. All known involved or interested persons were invited. The team compared data because further contamination had been identified in locations not consistent with previously identified vectors.
- S37-During this meeting, it was determined that the MO-967 dumpster had been emptied on the morning of September 28 and the refuse taken to the City landfill.
- S38-The DYN Transportation Operations manager and the DYN Director of ESH&Q notified the City landfill manager and the City engineer of potential contamination reaching the City landfill. The City landfill manager was called at 1:30 p.m. The City engineer was updated with further details by telephone at 4:00 p.m.
- S39-The RCT was dispatched to the City landfill on September 30 and was there from 1:30 p.m. to 3:30 p.m. No contamination was found during the survey of the site where Hanford Site refuse was believed to be placed, nor was any found on the compactor tractor.
- S40-The outside of garbage truck #3500, which had emptied the MO-967 dumpster on September 28, was found to be contaminated. The truck was shut and isolated inside a radioactive materials area inside the 273-E facility. The contents on the ground were loaded into a covered dump truck.
- S41-The Alternate Emergency Operations Center (EOC) was activated as the meeting place.
- S42-Precautionary isolation of about 2.5 hectares (6.2 acres) south of B Plant (later formalized on October 2 as the RBA [Fig. 9]) was completed while further investigations were conducted.
- S43-Planning was initiated with city management to retrieve the Hanford Site refuse from the City landfill.
- S43a-DYN Transportation Operations was notified of contamination in a dumpster.
- S44-The hauling of sanitary refuse in compactor trucks to the City landfill was suspended on September 30 until new plans could be approved by the City.
- S44a-The first eight flying-insect traps were placed near the 241-ER-152 Diversion Pit and the MO-967 Mobile Office.

**Figure 9. B Plant Radiological Buffer Area.**

- S45-Radiological control personnel conducted intensive radiological surveys of all personnel and equipment exiting the area placed in precautionary isolation.
- S46-Radiological Control personnel conducted intensive radiological surveys of all real estate and equipment around WESF.
- S48-A press release was issued by FDH.

#### Thursday October 1

- O1-PHMC management determined that a Situation Room was needed to coordinate activities related to this event. The Alternate EOC, a spacious conference room and the associated small, dedicated storage and office area at 2420 Stevens, was established as the Situation Room.
- O2-One truck of Hanford Site construction debris was accepted at the City landfill on the morning of October 1. Later that morning, the City rejected two truckloads of construction debris, and subsequently all refuse generated at the Hanford Site was halted. The City notified FDH and RL that no refuse from the Hanford Site would be accepted at the City landfill until the incident was resolved to the City's satisfaction.
- O3-An RCT resurveyed the City landfill. No contamination was found during the survey of the area where the refuse from the Hanford Site was dumped on September 28 and 29.
- O3a-At 1:45 p.m. on October 1, a DYN Road Maintenance supervisor, and a DYN Transportation Operations manager met with the City landfill manager and a representative of the Benton County Health Department. A plan was developed to excavate designated areas to survey for potential contamination. It was agreed to stage DOE equipment and set up portable fencing on October 2.
- O4-DE&S Hanford, Inc. (DESH), informed DYN that contamination was found on the boot of a carpenter before he entered the K Basins.
- O5-The 275-E Carpenter Shop Building was surveyed and one spot of contamination was found.
- O6-The Canister Storage Building complex was posted as an RBA (exit survey required).
- O7-Beta-emitting radiation contamination levels, ranging from 2,000 to about 1 million disintegrations per minute (d/min), were found fixed on facilities and refuse. The contamination primarily comprised <sup>90</sup>Sr; the highest-level reading was approximately 12 millirads per hour on a direct survey.
- O8-Contamination was found on refuse at the rear of truck #3500 and on the back door (up to 50,000 d/min per 100 cm<sup>2</sup>

- O9-Seasonal spraying and fumigating activities were ongoing to control pests such as ants, gnats, and fruit flies.
- O9a-Flying-insect traps were set in and around the precautionary isolation area (Fig. 10).
- O9b-Contaminated insects were found in traps that were set near the 241-ER-152 Diversion Pit on September 30, 1998.
- O10-Planning for retrieval from the City landfill continued with City of Richland management.
- O11-A press release was drafted by FDH and issued by the City of Richland. Media inquiries began. An interview was conducted with the *Tri-City Herald*.
- O12-A 19 liter (5-gallon) refuse can outside the 2247-B Ironworker's Shop was found to be contaminated. The refuse can contained cups with liquid, fruit flies, and other assorted refuse. The dose rate on the exterior of the galvanized refuse can was 3.0 mrad/h shallow dose and <0.5 mrad/h deep dose.

**Figure 10. Flying-Insect Trap.**





- O13a-The Occurrence Notification Center (ONC) officially notified the City of Richland of the possibility of landfill contamination.
- O13-The WDOH Air Emissions Section was notified of a potential unpermitted radioactive air emission after truck #3500 was opened and contaminated refuse fell to the ground. The agency also was informed that contaminated refuse might have been disposed of at the City landfill.
- O13c-The ONC initiated a follow-up not-classified notification [NCN] to offsite agencies as a result of finding contamination on the boot of a worker who was exiting a high-level waste tank farm on September 29 (see S34). The message indicated that the likelihood of contamination reaching the City landfill had increased because of the discovery of contamination on truck #3500.

#### Friday October 2

- O14-The 2.5 hectare (6.2-acre) RBA was formally established.
- O15-While garbage truck #6060 was in for repairs, refuse inside the front hatch was found to be contaminated; the truck was isolated in the 273-E facility.
- O16-Flying-insect traps and mouse traps were checked. The first contaminated fruit flies were found in traps on the porch at the MO-967 Mobile Office.
- O17-Contamination was found on pop cans (about 20,000 d/min per 100 cm<sup>2</sup>) outside of the 2711-E 200 East Area Garage in the pop-can recycling area.
- O18-Extensive bioassays began.
- O19-Contaminated fruit flies were found in a dumpster in the 200 East Area FDNW complex.
- O19a-About 8:00 a.m., a bulldozer and a backhoe were staged at the City landfill. Portable fencing was set on the sides of the cells containing refuse from the Hanford Site to isolate them from landfill workers and the public.

#### Saturday October 3

- O13b-WDOH was notified of RL's intent to remove contaminated refuse from the City landfill and return it to the Hanford Site for disposal.

#### Sunday October 4

- O20-Dumpsters outside of the 272-E Mockup Shop and the 2707-E Change House were found to be contaminated.

- O21-A garbage can was found with contaminated refuse outside of the WESF Maintenance Shop (225-BE).
- O22-More contamination was found in the 2711-E 200 East Area Garage men's shower room (40,000 d/min on a rubber floor mat outside the shower; 20,000 d/min on carpet).
- O23-Contamination was found in a dumpster at the MO-996 Mobile Office at 350,000 d/min.

#### Monday October 5

- O24-Six traps were placed at the City landfill.
- O24a-Insect trapping was expanded Sitewide.
- O25-Spot treatments with insecticides began near the 241-ER-152 Diversion Pit and at local dumpsters and garbage cans.
- O26-At the request of the FDH Vice President, Environment, Safety, Health and Quality, the PHMC, RL, City of Richland, and WDOH met and formed an integration team and four subteams (Policy, Radiological Control and Investigation, Solid Waste, and Operations) to gather facts relevant to the contamination issues. Personnel from FDH and DYN led these teams, which consisted of personnel from PHMC companies and RL. (See Appendix C for details about the Situation Room and the teams.) Before the meeting, WDOH met with DYN Radiological Control and expressed a concern that the 241-ER-152 Diversion Pit was the source.
- O26-The teams met daily with RL, other Hanford Site contractors, and the WDOH to keep everyone apprised of the activities. WDOH requested a daily status report.
- O26-Note: Three basic operating premises that guided the entire incident were established at this first meeting.
  - Any contamination outside the Hanford Site, and any contamination outside a radiologically controlled area, is unacceptable. The Hanford Site has "zero tolerance" for contamination spreads outside known radiation areas.
  - Protecting the health and safety of the public and Hanford Site employees is the first priority of FDH.
  - Maintaining and fostering a partnership with the City of Richland is highly valuable to the Hanford Site. Hanford Site officials would not be satisfied with solutions to the problems until the City was satisfied.
- O27-The first all-employee General Delivery notice was sent.

- O28-Throughout the incident, the teams updated the media, Site personnel, and officials from the City of Richland and Washington State about the decontamination activities.
- O29-A press conference was held by FDH; a representative of the City of Richland participated.
- O29a-The PHMC received a call from the Oregon Office of Energy regarding food service information.
- O30-The investigative team posted updates on the Hanford Site Intranet, the Site radio station, and a DYN telephone hotline.
- O31- Actions were taken to investigate potential contamination in the City landfill. DYN made plans for removal of any contaminated material found at the City landfill.
- O32-Contaminated fruit flies were found in traps in and around the MO-967 and MO-966 Mobile Offices.
- O33-Contamination was found near the 218-B Emergency Equipment Storage Shed and on the roadway of Atlanta Avenue near the intersection with 7<sup>th</sup> Street by a TWRS RCT.
- O34-WDOH requested that Notices of Construction (NOC) be prepared for excavation (retrieval) of contaminated refuse at the City landfill and for disposing (burial) of any contaminated refuse at the Hanford Site Low-Level Burial Grounds. Preparation of NOCs began with priority given to the NOC for burial of contaminated refuse at the Hanford Site Low-Level Burial Grounds because at that point no contamination had been uncovered at the City landfill (see O38).

#### Tuesday October 6

- O35-The first Hanford Site refuse cell location was confirmed in the City landfill through receipts and waste characteristics found in the refuse.
- O36-At the Canister Storage Building and surrounding office buildings, contamination was found in garbage cans, a plastic tub, and specks on the floor.

#### Wednesday October 7

- O37-The Policy Team began daily updates for government agencies.
- O38-The NOC for burial in the Low-Level Burial Grounds was approved by WDOH in the morning and the NOC was faxed to EPA for approval. A concerted effort was initiated with the support of WDOH to complete the NOC for retrieval actions at the City landfill. The NOC was completed and approved by WDOH late that evening, then faxed to EPA.

- The retrieval NOC was for removing contaminated refuse from the City landfill and transporting it to the 200 Areas of the Hanford Site.
- The burial NOC was for sorting and surveying the removed refuse and burying it at the Low-Level Burial Grounds in the 200 East Area.
- O39-Radioactive contamination was detected at the City landfill, primarily on food refuse. The contaminated materials found were consistent with the types and levels of material contamination found in the 200 Areas, specifically from samples taken from the 241-ER-152 Diversion Pit.
- O40-A clear plastic bag found at the City landfill read 70,000 d/min, and a piece of cardboard read 25,000 d/min of measured radioactivity.
- O41-DYN Radiological Control was prepared to perform airborne radiological monitoring downwind of the landfill excavation site. In addition, WDOH requested monitoring on each of the four radiological boundary sides, including upwind. Airborne radiological monitoring continued with negative results throughout the excavation process.
- O42-Retrieval operations at the City landfill were curtailed because of high winds, and the exposed materials were covered with tarps.
- O43-Per mutual understanding, work activity was halted pending completion and approval of the radioactive air emissions (retrieval) NOC for the activity.
- O44-The PHMC and a representative from the City of Richland held a press conference.
- O45-Vendor food trucks were identified as a possible mechanism for transporting contamination off Site. Four food vendor trucks were surveyed for the first time (two each for BS Express and Riders Sausage Haus); all the results were negative. The Solid Waste Team continued contacting all vendors who were recently in the area. Personnel and vehicle surveys were offered to the nonfood vendors, but they declined the offer.
- O46-A facsimile was received, in which WDOH ordered that work at the 241-ER-152 Diversion Pit cease and that measures be taken to isolate any potential release through the cover blocks. The WDOH expressed concern that activities thus far to isolate the release of radioactive material to the atmosphere via the insect intrusion had been incomplete/ineffective. WDOH requested that they be kept current on the progress of the investigation and recovery activities.
- O48-B Plant/WESF employees requested more information. They requested that clear and appropriate terminology be used in onsite and offsite news releases.
- O49-The U.S. Environmental Protection Agency (EPA) approved the NOC for burial via facsimile.

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Thursday October 8

- O47-The garbage trucks servicing the 200 East Area were fogged.
- O49a-The U.S. Environmental Protection Agency (EPA) approved the NOC for retrieval via facsimile.
- O50-The WDOH approved the Radiological Control Team installing two flying-insect traps in the 241-ER-152 Diversion Pit. This involved installing a glovebag over an access port into the 241-ER-152 Diversion Pit to permit sampling inside the pit to validate it as a significant source of contamination. The glovebag contained one trap; a second trap was suspended inside the pit.
- O51-During the installation of the glovebag, a dead contaminated fruit fly was found in the 241-ER-152 Diversion Pit. This confirmed the diversion pit as the source of the contamination.
- O52-The Solid Waste Team began a series of meetings with the City of Richland to discuss the requirements for resuming hauling solid refuse to the City landfill.
- O53-Normal work resumed at the Canister Storage Building construction site, where contamination had been removed from several locations in and around the building.
- O54-A meeting was held with concerned employees.
- O55-Personnel monitoring was offered to workers at the construction site.
- O56-The four food vendor trucks were surveyed for the second day; again the results were negative. Daily surveys continued.
- O57-Dursban 50W<sup>TM</sup> insecticide treatment was initiated at the City landfill.
- O58-Ninety-five flying-insect traps were set at locations on Site and off Site.
- O59-A new page was added to the Hanford web site, accessible at <http://www.hanford.gov/safety/consread/index.html>.

Friday October 9

- O49-The approved NOC for retrieval was delivered to the City landfill by an environmental engineer for the WHC Environmental Services, Air and Water Services, to brief workers on the requirements of the NOC.

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<sup>TM</sup>Dursban 50W is a trademark of Dow Chemical Company.

- O60-Refuse removed was surveyed and packaged at the landfill. Removal of the potentially contaminated refuse from the City landfill began at 7:30 a.m.
- O61a-The potentially contaminated refuse from the City landfill was delivered to the 200 East Area Low-Level Burial Grounds.
- O61b-Refuse collected on Site was disposed of in the Low-Level Burial Grounds in the 200 West Area.
- O62-Contaminated fruit flies were discovered in traps in the 241-ER-152 Diversion Pit and in traps set in the glovebag the previous day. Analysis later proved that the radiological signature matched that of the contamination spread.
- O63-Work in the City landfill was planned for daylight hours over the weekend.

#### Saturday October 10

- O64-In an effort to control pests, malathion 50 was sprayed around the RBA at B Plant. This was the first fogging at the RBA.
- O65-Contaminated material was found in a second cell at the City landfill. Hot specks measured 1,000,000 d/min or 13 mrad/h. One truck was loaded at the City landfill and returned to the Site; a second truck was loaded.

#### Sunday October 11

- O66-The last contamination spot was found in the City landfill.
- O67-DYN, FDH, RL, the City of Richland, and WDOH agreed that (invasive) excavation of the landfill should be stopped after removal of identified contamination and that further exploration, if necessary, should be performed by geo-probe (remote core drilling).
- O68-The RBA was fogged a second time.
- O68a-One bag of refuse was found contaminated in a dumpster northeast of the 2750-E Building and another in the dumpster on the north side of the 2750-E Building.

#### Monday October 12

- O70-Activities to remove Hanford Site refuse from the City landfill were completed except for one contingency container that remained at the City landfill until October 14, in case any other contaminated refuse was found.
- O71-Insecticide treatments at the City landfill were terminated.
- O71a-The RBA was fogged a third time.

- O72-Surveying of Site dumpsters continued.
- O74-Contaminated refuse was found in a dumpster by the 2306-W Bottle Storage (Skid Shack) in the 200 West Area (20,000 d/min). This contamination was not related to the fruit fly incident.

#### Tuesday October 13

- O75-WDOH and the EPA approved a modification to the Low-Level Burial Grounds NOC to increase the number of loads from 10 to 50 and to allow for the use of vehicles other than standard compactor trucks in the 200 West Area.
- O76-No fogging occurred at the RBA because of high winds.

#### Wednesday October 14

- O69-In all, boxes containing 191,000 kilograms (210 tons) of material were taken from the City landfill to the 200 East Area low-level burial grounds. A total of 544,000 kilograms (600 tons) of refuse were excavated and 23 kilograms (50 pounds) of contaminated material were found.
- O76a-The contingency container, containing another 6,800 kilograms (7.5 tons) of material, was removed from the City landfill to the Site.
- O77-Surveys of the excavation at the City landfill were completed, the disturbed landfill area was restored, and a layer of cover soil was placed over the area.
- O78-The City of Richland agreed that activities at the landfill were complete relative to the retrieval of refuse from the September 28 and 29 Hanford Site deliveries.
- O79-Contaminated fruit flies were found in the traps in the 241-ER-152 Diversion Pit and the glovebag over the pit.
- O80-Contamination was found on refuse in a dumpster near the 2201-B Construction Ice House.
- O81-No fogging occurred at the RBA because of high winds.

#### Thursday October 15

- O82-All Hanford Site equipment and personnel involved in this event were demobilized, although the teams continued their investigations.
- O83-Spraying and fogging resumed at the RBA and continued until October 19.



Sunday October 18

- O83a-Surveys of the RBA were completed.

Monday October 19

- O84-A shoulder-to-shoulder survey was conducted at the RBA south of B Plant; the RBA was released and returned to normal operations.
- O85-Fogging was terminated at the RBA.

Tuesday October 20 - Sunday October 25

- O85a-No significant events occurred.
- O85b-Site surveys continued. Dumpster and vendor surveys were ongoing.

Wednesday October 21 - Wednesday October 28

- O85c-Pacific Northwest National Laboratory placed 10 flying-insect traps off Site. The insects trapped were found to be not contaminated.

Monday October 26

- O86-A flying-insect trap just outside the glovebag over the 241-ER-152 Diversion Pit was found to contain 100,000 d/min of beta/gamma-contaminated fruit flies.
- O87-A flying-insect trap on the north side of the MO-966 Mobile Office near B Plant was found to contain 500,000 d/min of beta/gamma contamination.
- O88-A plastic bag containing food garbage in a dumpster just outside the 2101-M Building (south of B Plant) was found to contain 30,000 d/min. The dumpster was sealed in plastic and taken out of service.
- O88a-The 241-ER-152 Diversion Pit was inspected at the request of WDOH, and some leaks in the seal were identified and corrected.
- O89-Fogging was resumed at the RBA and continued through October 31.
- O90-RL briefed the City of Richland.

Tuesday October 27

- O91-Site pest-control specialists sprayed the 241-ER-152 Diversion Pit and its glovebag cover with pyrethrin (PT-565).

Wednesday October 28

- O92-Site pest control specialists sprayed the area around the 241-ER-152 Diversion Pit with PRO Control Plus<sup>TM</sup> (a pyrethroid insecticide) and placed new insect traps inside the pit to determine if the pests had been controlled.

Friday October 30

- O93-One contaminated fruit fly (60,000 d/min) was found in a flying insect trap near a U.S. Ecology dumpster, which is located southwest of the 241-ER-152 Diversion Pit. The fruit fly contained the same contamination mix as did the previously found contaminated fruit flies. This turned out to be the last contaminated fruit fly captured during the incident. Review of wind patterns show that, for 2 days, wind speeds in excess of 13 km (8 mi/h) blew from the direction of the 241-ER-152 Diversion Pit.
- O94-To secure refuse disposal capability in addition to that of the City landfill, DYN and BDI Transfer prepared a memorandum of agreement for nonhazardous, nonradioactive refuse disposal services. The memorandum of agreement includes the requirements that the Site must meet (no radioactive materials, monthly surveys of dumpsters, random load inspections, etc.) to comply with the agreement. The end date of this memorandum of agreement is September 30, 1999.
- O94-The memorandum of agreement includes a graded survey approach in which the Site will inspect and spot survey all Site refuse for a 30-day baseline period. Factors to be considered in taking this graded approach include the following:
  - Availability of engineering and/or administrative controls
  - Proximity to sources of contamination
  - Nature of the process generating the refuse
  - History of past contamination
  - Frequency of activities involving the use of radioactive materials
  - Availability of biological vectors or other means of contamination spread
  - Detection capability for the type of radiation expected to be emitted.

Monday November 2 - Monday November 9

- N1-Fogging resumed at the former RBA and continued until November 9.

Monday November 2

- N2-In the Canister Storage Building area, a contamination count of 7,500 d/min direct was found on a trash can.

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<sup>TM</sup>PRO Control Plus is a trademark of Stein, Inc.

Friday November 6

- N3-A dead fruit fly, with a contamination count of 250,000 d/min., was found in the office of the 2247-B Ironworker's Shop.

Monday November 9

- N4-Fogging was terminated at the former RBA.

Tuesday November 10

- N5-The memorandum of agreement between DYN and BDI Transfer was signed. The nonexclusive agreement for the disposal of nonhazardous, nonradioactive refuse generated at the Hanford Site requires that refuse be sorted and surveyed before removal from the Site. (See Section 5.4.2.1 for details of this agreement.)

Thursday November 12

- N6-A temporary survey station was established in the 4843 Storage Building in the 400 Area. All Hanford Site refuse will be surveyed in the 4843 Storage Building before going off Site. This will continue until a permanent solution is implemented.
- N7-The first load of refuse was surveyed in the 4843 Storage Building.

Monday November 16

- N8-A contamination count of 100,000 d/min (apparently pieces of a fruit fly) was found on a bag of refuse at the 4843 Storage Building survey area (refuse monitoring station).
- N9-The first shipment of Hanford Site refuse was released to BDI Transfer.

Tuesday November 17

- N10-Six flying-insect traps were placed at the 4843 Storage Building and remained active through the period covered by this report (December 31).

Friday December 4

- D1-All flying-insect traps were removed and/or closed down by December 4 except the six in the 4843 Storage Building.

Thursday December 31

- D2-Between November 16 and December 31, no further contamination was reported at the 4843 temporary survey station.

D3-December 31 was determined to be the cutoff date for this report.

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